

CLAIMS:

1. A vehicle for moving through a fluid, the vehicle comprising:
forward portion and a rearward portion opposite the forward portion,
a first pair of wings arranged at the forward portion of the vehicle;
a second pair of wings arranged at the rearward portion of the vehicle; and
a body connected to the forward pair of wings and connected to the rearward pair of wings, the body being arranged to drive the forward pair of wings alternately toward each other and apart and the body being arranged to drive the second pair of wings alternately toward each other and apart.
2. The vehicle according to claim 1, further comprising:
a power source.
3. The vehicle according to claim 2, wherein the power source is a battery.
4. The vehicle according to claim 1, wherein each of the wings comprises a flexible sheet.
5. The vehicle according to claim 1, wherein the wings have a camber during an upstroke opposite of their camber during a downstroke.
6. The vehicle according to claim 1, wherein the body includes at least two beams pivotally connected to each other at a central portion of the two beams.
7. The vehicle according to claim 1, wherein pivotal motion of the beams in a direction away from each other drives the forward pair of wings away from each other and drives the

rearward pair of wings away from each other, and wherein pivotal motion of the beams toward each other drives the forward pair of wings toward each other and the rearward pair of wings toward each other.

8. The vehicle according to claim 1, wherein each of the wings has a leading edge connected to the body at a central portion of the leading edge.

9. The vehicle according to claim 1, wherein each of the wings has a wingspan and is pivotally connected to the body at a midpoint of the wingspan.

10. The vehicle according to claim 1, wherein each of the wings has a leading edge pivotally connected to the body.

11. The vehicle according to claim 10, wherein the body includes at least two pivotally connected beams,

a forward portion of one of the beams is connected to the leading edge of one of the forward pair of wings, and

a forward portion of the other of the beams is connected to a leading edge of another of the forward pair of wings.

12. The vehicle according to claim 11, wherein at least one of the beams has an arcuate forward portion forward of the pivotal connection between the beams.

13. The vehicle according to claim 1, wherein at least one of the wings includes a flexible sheet, a stiff leading edge, and a batten arranged at a rear portion of the wing.

14. The vehicle according to claim 1, further comprising:

at least one mechanical stop arranged to limit a range of motion of the wing.

15. The vehicle according to a claim 1, further comprising:

a first boom connected to a forward portion of the structure to limit the range of motion of one of the forward pair of wings, and a second boom connected to a forward portion of the structure to limit the range of motion of another of the forward pair of wings.

16. The vehicle according to claim 1, further comprising a receiver adapted to receive radio control signals for controlling at least one of vehicle speed and vehicle direction.

17. The vehicle according to claim 1, further comprising:

a rudder for controlling vehicle direction.

18. The vehicle according to claim 1, wherein the body is arranged to simultaneously drive the forward pair of wings together and the rearward pair of wings together, and thereafter to simultaneously drive the forward pair of wings apart and the rearward pair of wings apart.

19. The vehicle according to claim 1, wherein the body is arranged to drive the forward pair of wings together and to thereafter drive the rearward pair of wings together.

20. The vehicle according to claim 1, wherein at least one of the wings includes at least two independently movable wing surfaces arranged at opposite lateral sides of the vehicle.

21. The vehicle according to claim 1, wherein the wings of at least one of the forward and rearward pair of wings contacts each other during flight.

22. A vehicle for moving through a fluid, the vehicle comprising:

a body having two ends, at least one pivot point, and at least two structural members

connected at the pivot point,

a first pair of wings, each wing of the first pair of wing being connected to one of the structural members at a midspan of the wing,

a second pair of wings, each wing of the second pair of wings being connected to one of the structural members at a midspan of the wing,

and a drive mechanism adapted to drive the first pair of wings toward each other and apart and to drive the second pair of wings toward each other and apart to propel the vehicle forward.

23. The vehicle according to claim 22, further comprising:
a power source.
24. The vehicle according to claim 23, wherein the power source is a battery.
25. The vehicle according to claim 22, wherein each of the wings comprises a flexible sheet.
26. The vehicle according to claim 22, wherein the wings have a camber during an upstroke opposite of their camber during a downstroke.
27. The vehicle according to claim 22, wherein the body includes at least two beams pivotally connected to each other at a central portion of the two beams.
28. The vehicle according to claim 22, wherein pivotal motion of the beams in a direction away from each other drives the forward pair of wings away from each other and drives the rearward pair of wings away from each other, and wherein pivotal motion of the beams toward each other drives the forward pair of wings toward each other and the rearward pair of wings

toward each other.

29. The vehicle according to claim 22, wherein each of the wings has a leading edge connected to the body at a central portion of the leading edge.

30. The vehicle according to claim 22, wherein each of the wings has a wingspan and is pivotally connected to the body at a midpoint of the wingspan.

31. The vehicle according to claim 22, wherein each of the wings has a leading edge pivotally connected to the body.

32. The vehicle according to claim 22, wherein the body includes at least two pivotally connected beams,

a forward portion of one of the beams is connected to the leading edge of one of the forward pair of wings, and

a forward portion of the other of the beams is connected to a leading edge of another of the forward pair of wings.

33. The vehicle according to claim 32, wherein at least one of the beams has an arcuate forward portion forward of the pivotal connection between the beams.

34. The vehicle according to claim 22, wherein at least one of the wings includes a flexible sheet, a stiff leading edge, and a batten arranged at a rear portion of the wing.

35. The vehicle according to claim 22, further comprising:
at least one mechanical stop arranged to limit a range of motion of the wing.

36. The vehicle according to a claim 22, further comprising:

a first boom connected to a forward portion of the body to limit the range of motion of one of the forward pair of wings, and a second boom connected to a forward portion of the structure to limit the range of motion of another of the forward pair of wings.

37. The vehicle according to claim 22, further comprising a receiver adapted to receive radio control signals for controlling at least one of vehicle speed and vehicle direction.

38. The vehicle according to claim 22, further comprising:
a rudder for controlling vehicle direction.

39. The vehicle according to claim 22, wherein the body is arranged to simultaneously drive the forward pair of wings together and the rearward pair of wings together, and thereafter to simultaneously drive the forward pair of wings apart and the rearward pair of wings apart.

40. The vehicle according to claim 22, wherein the body is arranged to drive the forward pair of wings together and to thereafter drive the rearward pair of wings together.

41. The vehicle according to claim 22, wherein at least one of the wings includes at least two independently movable wing surfaces arranged at opposite lateral sides of the vehicle.

42. The vehicle according to claim 22, wherein the wings of at least one of the forward and rearward pair of wings contacts each other during flight.